

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/20268

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : A61M 1/12
US CL : 600/17

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 600/16, 17

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,E	US 6,623,420 B2 (REICH et al.) 23 September 2003, see entire document.	3

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier application or patent published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search

06 October 2003 (06.10.2003)

Date of mailing of the international search report

01 DEC 2003

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
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BOX II. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

Group I, claim(s) 1, 16 and 17 drawn to time and frequency domain flow measurements.

Group II, claim(s) 2, 16 and 19 drawn to measuring instantaneous pump power or current.

Group III, claim(s) 3-6, 10-12 and 16 drawn to resting heart rate and exercise.

Group IV, claim(s) 7-8, 10-12, 15 and 16 drawn to control having constant flow, amplitude and speed..

Group V., claim(s) 9 and 16, drawn to unloading.

Group VI, claim(s) 13 and 14, drawn to diastolic flow.

Group VII, claim(s) 18, drawn to dQ/dn .

The inventions listed as Groups I-VII do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: each of the methods requires different feedback for flow control thus making them independent.

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Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claim Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claim Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claim Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
Please See Continuation Sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest ☐ The additional search fees were accompanied by the applicant's protest.
☐ No protest accompanied the payment of additional search fees.

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Box III TEXT OF THE ABSTRACT (Continuation of Item 5 of the first sheet)

A physiologic control system and method for controlling a blood pump system such as a VAD system. The pump includes, for example, a blood pump (12) and a controller (80) for controlling the pump. The system may further include a flow measurement device (124). Various control schemes are disclosed, including controlling the pump to achieve one or more of a desired speed, flow rate, or flow pulsatility. Additionally, various methods for determining maximal flow (the maximum flow that can be achieved from the patient while maintaining certain parameters or within certain boundaries are disclosed.